ANNE PHILIPPA COBBE

I. W. BUSBRIDGE

Anne Philippa Cobbe was born in 1920. She was the younger daughter of General Sir Alexander Cobbe, who died when she was nearly eleven. She was educated at Downe House, Newbury, where she was a very promising pupil. She started reading mathematics in the Sixth Form but then changed to history because she was afraid of becoming narrow-minded, and it was on history that she first entered for Somerville College, Oxford. The examiners reported that she was clearly reading the wrong subject! A year later she entered on mathematics and won an exhibition.

Anne Cobbe went up to Oxford in October 1939. Up to that time it had been traditional for women reading mathematics to have four years at Oxford because they started so far behind the men who had come from public schools. It was soon clear that Anne had exceptional mathematical ability and that her course should be cut to three years. In Honour Moderations (1940) she had not quite caught up with the men and she just missed a first. In Finals (1942) she wrote an outstanding set of papers including two on geometry taken as a special subject.

At the end of Anne's first year in Oxford, her brother, who was in the R.A.F.V.R., was reported missing, presumed killed, in the Battle of Britain, and by the time that she left Oxford it was clear that he must have been killed. As Anne hoped to read for a research degree when the war was over, she was directed into the Department of Operational Research, Admiralty, where she became a temporary experimental officer. The strain of this war work combined with the shock of her brother's death brought on a temporary breakdown in health. On her recovery she returned to the Admiralty until the end of the war, but for some years the symptoms of her illness were liable to recur if she over-worked. This undoubtedly affected her output of original work.

No account of Anne Cobbe's life would be complete without some mention of her very happy home at Wittersham, Kent. Soon after the war, Lady Cobbe started a market garden to which she later added a herd of pedigree pigs, breeding and fattening pigs for bacon and pork. After the death of their mother in 1956, Anne and her sister continued to run the pig farm until about 1965. Anne did most of the accounts when she was at home in the vacations and she took a great interest in the propagation of flowers and fruit. She loved growing plants and she always had a garden in Oxford as well as at home. This was one of her chief relaxations from mathematics and listening to music was another.

Anne Cobbe read algebra for the degree of D.Phil. under the supervision of Professor J. H. C. Whitehead. In 1947 she was appointed lecturer at Lady Margaret Hall, a post which she held until 1955, when she returned to Somerville as fellow and tutor in mathematics. As a tutor she was at her best. (She did not enjoy lecturing

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and her lectures did not have the same impact as her tutorials.) She was always well read in mathematics and she was a most stimulating tutor. Moreover she took a genuine interest in all her pupils and would have any pupil who was in personal trouble to stay in her flat. She was generous with her time and was always ready to help either an undergraduate or a research student who was floundering because of insecure foundations in algebra.

At Somerville Anne's outstanding gifts as an administrator were discovered and she became a much-valued member of the Governing Body. In addition to the normal committee work, she took on the oversight of the College garden for some time and she was Chairman of the committee electing the Mary Somerville Research Fellow. Her health deteriorated rapidly after 1969 and she resigned her fellowship and tutorship from April 1971. However the Governing Body valued her wisdom too much to let her retire completely and she was elected to an "additional fellowship". Characteristically she "came back" for the Michaelmas Term of 1971 in order to help during the absence of a tutor on study leave and she died at the end of the term.

Anne Cobbe's published work was limited to three papers.† All were early contributions to pure homological algebra, when both notations and approach were different from those adopted recently. Her first paper [1] was a general study of the algebraic structures arising from 2-dimensional homotopy groups. These were studied in full generality and she related them to the cohomology theory of groups and to work of Maclane on extensions of groups. This paper is interesting in that it illustrates very clearly how much even the purest of algebraic cohomology theory arose directly from topological considerations.

Her third paper [3] was written jointly with R. L. Taylor of the U.S.A. as a result of a letter from him about paper [1]. It seeks an understanding of the deeper relationship between 2- and 3-dimensional cohomology groups and extensions of one group by another. It tackles the very difficult problem of deciding, from the action of certain automorphism groups on a cohomology group, when two cohomology classes represent isomorphic extensions.

In paper [2] Anne computed the exponent of a cohomology group $H_n(Q, G)$, where Q is finite and G is an abelian group on which Q acts, in terms of the order of Q and the structure of G. These results are now well-known and their origins have been obscured by time. They fall very naturally out of modern descriptions of the cohomology of a finite group, and even when Anne Cobbe was writing they were known at least in part to people such as Cartan and Eilenberg (*vide Homological Algebra*, Princeton University Press, 1956), though never properly worked out by them.

Among Anne's papers were found parts of a projected exposition of the theory of modules over an abitrary ring. This was intended as a set of lecture notes to be published by the Oxford Mathematical Institute. She planned this in July 1971 and the two chapters that she wrote are good and lively. It is a great pity that she was

† I am indebted to Dr. P. Neumann for the appraisal of these papers.

unable to finish this. In Oxford she was the expert on homological algebra and ring theory and she was greatly regarded by her mathematical colleagues both for her expertise and for her kind, sensible and immensely encouraging attitudes.

Papers by A. P. Cobbe

1. " Some algebraic properties of crossed modules ", *Quart. J. Math. Oxford*, 2 (1951), 269–85.
2. " On the cohomology groups of a finite group ", *Quart. J. Math. Oxford*, 6 (1955), 34–47.
3. " On Q-kernels with operators " (with R. L. Taylor), *Quart. J. Math. Oxford*, 8 (1957), 13–38.